Knowledge, awareness, and practice of biomedical waste segregation in a dental office

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ABSTRACT

Biomedical waste (BMW) is any sort of litter generated in the course of human or animal research operations, such as diagnosis, treatment, or immunization, or during the development or trial of pharmaceutical products or in health camps. In dental sectors, BMW, if not adequately handled, can provide a number of health risks to dental practitioners, patients, and other dental healthcare service providers who operate in dental offices. The aim of the study is to examine the knowledge, awareness, and practice of BMW segregation among dental offices. A well-framed questionnaire containing 10 self-structured questions was formed and distributed among 100 students of dentistry through an online Google Forms link. The results were collected, tabulated, and statistically analyzed using the Software SPSS. Chi-square test was performed to assess the P value. Biological waste segregation was known to 98% of the participants, in which most of them had more than 10 years of expertise in dentistry. It is evident that dentists with a lot of experience over the years in the field of dentistry possess considerably increased awareness regarding the segregation of BMWs in their dental offices. Chi-square test done between the years of experience in dentistry and the knowledge on BMW segregation reveals that $0.031 < 0.05$ is the P value, which is statistically significant. Most dentists having experience of above 10 years in the field of dentistry have excellent knowledge and practice of segregating BMWs in their dental offices.

Key words: Awareness, biomedical waste, dental office, innovative technology, knowledge, practice, segregation

INTRODUCTION

Biomedical waste (BMW) is any sort of litter generated in the course of human or animal research operations

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connected to the production or trial of pharmaceutical products in health camps.[1] It holds a cradle-to-grave sequence to BMW as categorization, calibration, partition, cache, transit, and treatment. The fundamental notion of good BMW behavior is founded on the 3R's philosophy, which stands for Reduce, Recycle, and Reuse.[2] The supreme BMW management (BMWM) practice aims at avoiding the creation of litter or retrieving as much waste as possible, rather than dumping it.[3] As a result, the many strategies of BMW disposal are, in the order of desirability, to avoid, minimize, reuse, recycle, recover, treat, and finally discard.[4] BMW at dental clinics, if not correctly handled, can pose a number of health risks to dental practitioners, dental

assistants, patients, and other oral healthcare workers who work in dental offices.[5] Each dental healthcare professional should be knowledgeable about biological waste maneuver and disposition.[6] Plastic, latex, cotton, glass, amalgam waste, disinfectants, chemicals, dental casts and impressions, surgical needles, extracted teeth, blades, human tissues, and expired medicines are some of the BMWs generated in dental offices.[7] All of these materials are dangerous because they are contaminated with saliva and blood, which contain disease-causing microorganisms.

Generation, sorting, segregation, usage of color-coded waste disposal bags, collecting, storage, packing, transit, unpacking, filtering, treatment, annihilation, conversion, or transfer, and disposal of such garbage were the stages involved in its management.[8] Every dentist is responsible for ensuring that biological waste is handled and disposed of in a safe way.[9] All healthcare employees involved in the processing of biological waste should get initial training, which should be renewed annually.[10] To prevent illnesses, all healthcare professionals involved in the handling of biological waste should be immunized.[11] Contagious litter, pathological litter, sharps, synthetic waste, toxic waste, and irradiated waste are all examples of hazardous waste. Nonhazardous trash includes disposable paper towels, paper mixing pads, and working surface coverings.[12] The separation of biological waste, the appropriate color given, and the kind of container to be utilized are the most important aspects of waste management. According to the Central Pollution Control Board's 2016 standards, BMW is classified into many categories.[13]

Nonchlorinated plastic bags of the color yellow can be used to dispose of human anatomical waste, abandoned pharmaceuticals and cytotoxic drugs, liquid wastes created in laboratories, and washing, cleaning, and disinfecting operations.[14] Containers that are white in color, transparent, puncture-proof, and leak-proof are preferable for disposing of sharp wastes such as needles, syringes, and scalpels.[15] Nonchlorinated red plastic bags can be used for solid wastes such as things contaminated with blood and bodily fluids, tubings, catheters, intravenous sets, and other blood-contaminated materials.[9,16] Our team has an opulence of research expertise, which has yielded high-standard publications.[17-36] The purpose of this study is to examine dentists' knowledge and awareness of biological waste segregation in dental offices.

MATERIALS AND METHODS

Study design
An online survey portal was used to circulate among general dental practitioners and specialists.

Study subjects
One hundred participants were chosen using a basic random sampling approach.

Ethical considerations
Saveetha Dental College's Institutional Review Board issued ethical consent for the research work with the clearance number IHEC/SDC/ENDO/164.

Study methods
Fifteen self-administered questionnaires (including demographic details such as age and gender) were created and dispersed among the participants via an online Google Forms link. The dependent variables include awareness and lifestyle, while the independent variables are age, sex, and gender. To remove bias, basic random sampling was used. Participants were asked to properly read the questions and respond.

Statistical analysis
The collected data were inserted in Google Sheets and transferred to IBM SPSS Version 22.0, Armonk, New York: IBM Corp. The statistics were substantiated by the guide. Descriptive statistics were carried out. Chi-square analysis was used, and $P = 0.031$ (<0.05) was deemed statistically significant.

RESULTS

All results were obtained from SPSS Software by percentage analysis. As shown in Figure 1, 61% of the participants agreed on the usage of blue disposal bags for outdated medicines. Figure 2 shows that 94% of the participants were aware of disposing of body fluids in yellow disposal bags. As shown in Figure 3, 70% of the participants reported that red disposal bags should be used for the disposal of syringes, gloves, and plastic wastes. The association graphs [Figures 4 and 5] describe the awareness of BMW disposal based on the years of experience of dental professionals. According to this study, younger individuals
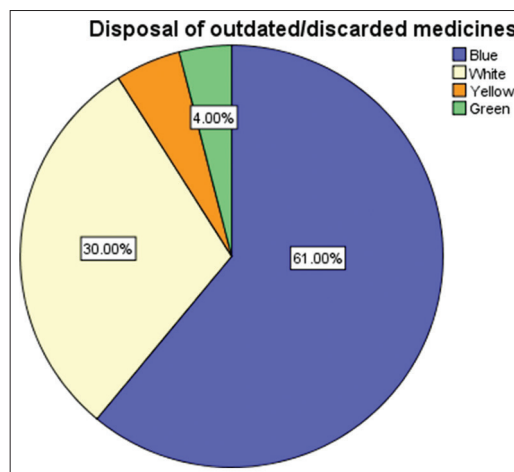

Figure 1: The pie chart represents the percentage distribution of awareness of color code for disposal of discarded medicines. 61% of the participants reported blue (blue); 30% of the participants reported white (green); 4% of the participants reported green (violet)
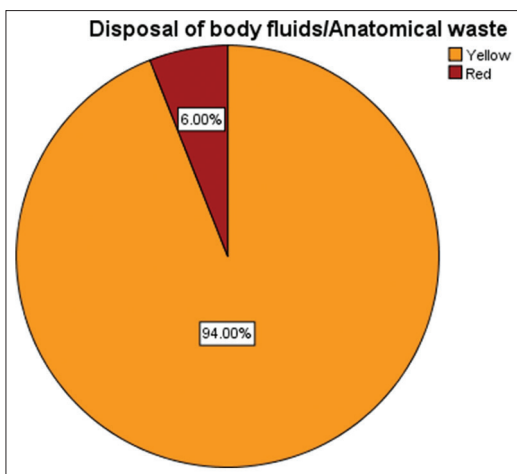
Figure 2: The pie chart represents the percentage distribution of awareness of color code for disposal of body fluids. 94% of the participants reported yellow (yellow)
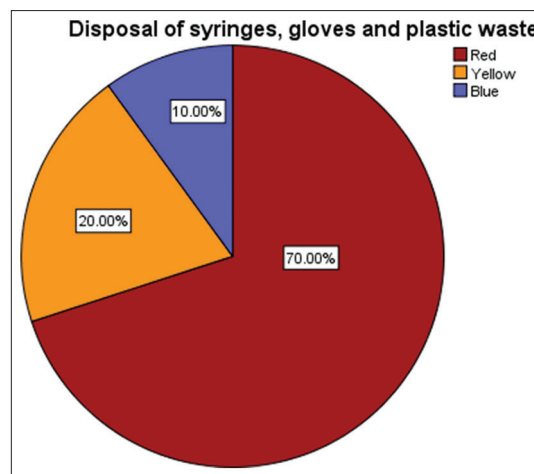

Figure 3: The pie chart represents the percentage distribution of awareness of color code for disposal of syringes, gloves, and plastic wastes. 70% of the participants reported red (red); 20% of the participants reported yellow (yellow); 10% of the participants reported blue (blue)
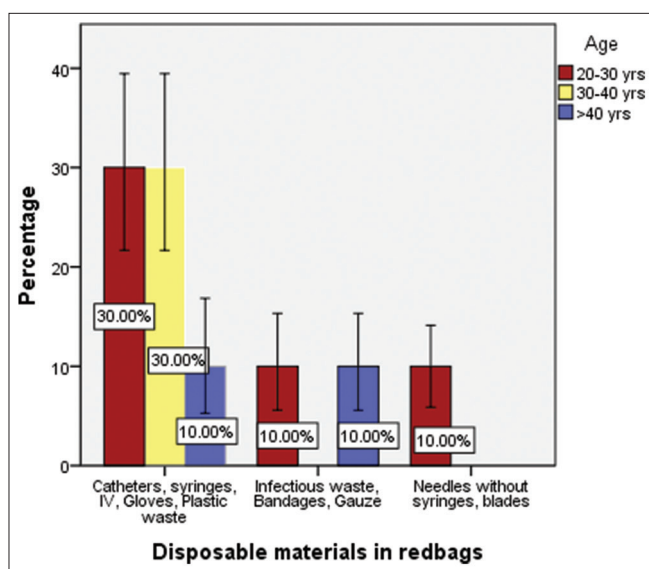

Figure 4: The histogram illustrates the interrelation between years of experience in dentistry and the knowledge of the dentists on disposable wastes in red bags. X axis constitutes the years of experience; Y axis constitutes the responses. Dentists having 5–10 years (red) of clinical experience are more aware of biomedical waste segregation. Pearson's Chi-square test reveals $P = 0.031$ (<0.05). Thus, it is statistically significant

Figure 5: The histogram illustrates the interrelation between years of experience in dentistry and the knowledge of the dentists on the disposal of syringes, gloves, and plastic wastes. X axis constitutes the years of experience; Y axis constitutes the responses. Dentists having 5–10 years (red) of clinical experience are more aware of biomedical waste segregation. Pearson's Chi-square test reveals $P = 0.025$ (<0.05). Thus, it is statistically significant

with 5–10 years of clinical practice have sound knowledge and are constantly updating themselves regarding BMW segregation in their dental offices. Based on the Chi-square test, $P = 0.031$ (<0.05), which is statistically significant, and the standard deviation value was 0.013.

DISCUSSION

Prior treatment of laboratory microbiological waste and bodily fluids is required before disposal. According to the World Health Organization, the methods of sterilization
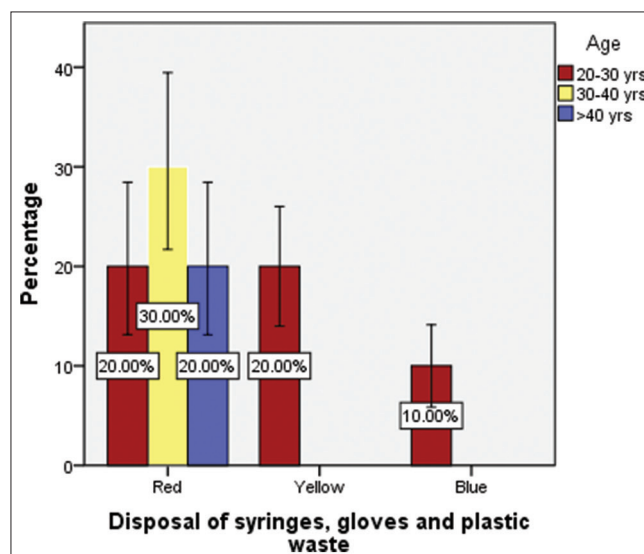
and disinfection must be used. All healthcare staff should be properly trained and immunized against illnesses such as hepatitis B and tetanus. India alone has been claimed to create around 2 kg/bed/day of BMW 3. Several studies have been conducted to measure dental office staff knowledge and awareness of biological waste segregation.

Sharps such as needles, blades, burs, and files should be disposed of in a red or yellow puncture-proof container with a cover that cannot be removed, according to 92% of

the participants in a survey performed by Agarwal *et al*. The container should be properly labeled with a biohazard symbol.[37] According to the current survey, 95% of the participants reported that sharps can be disposed of in a red container. According to a recent survey in Bangalore, 47.6% of private dentists effectively separated trash, 64.3% did not segregate waste before disposal, and 42.1% stated that a shortage of waste management agencies was the biggest obstacle.[38] The drawbacks of this study consist of a small population and a number of questions, which might be addressed in future research.

CONCLUSION

In this study, dentists had more understanding and awareness of biological waste segregation. According to a statistical study, young dentists have significantly enhanced knowledge of biological waste segregation in their dental practice. They are constantly upgrading their clinical expertise on biological waste disposal.

Conflicts of interest
There are no conflicts of interest.

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